

US EPA ARCHIVE DOCUMENT

11 0 MAY 1993

Date Out:

DP Barcode: D187271
Chemical Code: 122804**ENVIRONMENTAL FATE AND GROUND WATER BRANCH****Review Action**To: George LaRocca, PM #13
Registration Division (H7505C)From: Paul Mastradone, Section Chief *PM*
Chemistry Review Section 1
Environmental Fate & Ground Water Branch/EFED (H7507C)Thru: Henry Jacoby, Chief *Henry Jacoby 5/10/93*
Environmental Fate & Ground Water Branch/EFED (H7507C)

Attached, please find the EFGWB review of...

Common Name:	Abamectin	Trade name:	ZEPHYR 0.15 EC
Company Name:	Merck & Co., Inc.		
ID #:	000618-00097		
Purpose:	Review additional soil analyses results to satisfy requirements of previous field dissipation study.		

Type Product:	Action Code:	EFGWB #(s):	Review Time:
Insecticide, miticide	320	93-0352	3 days

STATUS OF STUDIES IN THIS PACKAGE:

Guideline #	MRID	Status ¹
164-1	426276-00	A
	426276-01	

**STATUS OF DATA REQUIREMENTS
ADDRESSED IN THIS PACKAGE:**

Guideline #	Status ²
164-1	P

¹Study Status Codes: A=Acceptable U=Upgradeable C=Ancillary I=Invalid.

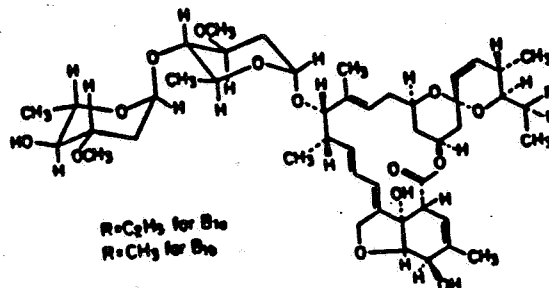
1.0 CHEMICAL:

Common name: Abamectin

Chemical name: Avermectin

Trade Name: ZEPHYR, AGRI-MEK

Chemical Structure:



2.0 TEST MATERIAL: 0.15EC Formulation

3.0 STUDY/ACTION TYPE: Registrant has submitted additional soil analyses of samples collected at application intervals during field dissipation study.

4.0 STUDY IDENTIFICATION: Wertz, P.G. 1993. Supplemental Soil Residue Data in Support of an Application for Registration of Abamectin. Soil Leaching and Dissipation Study 001-87-6045R. MRID Nos. 40927101, 40927102, & 41191501. Performed by Analytical Development Corporation, Colorado Springs, Co for Merck & Co., Inc., Three Bridges, N.J. MRID No. 426276-00 and 426276-01.

5.0 REVIEWED BY:

George Tompkins
Entomologist, Review Section 1
EFGWB/EFED

Signature: *George Tompkins*

Date: 10 MAY 1993

6.0 APPROVED BY:

Paul Mastradone
Section Chief, Review Section 1
EFGWB/EFED

Signature: *Paul Mastradone*

Date: 10 MAY 1993

7.0 CONCLUSIONS:

7.1 Based on the previously reviewed study (EFGWB # 90710 and 90711) and the additional information supplied in this submission, it can be concluded from the soil analyses taken from the soil samples from 0-12 inches after each application (each application of abamectin 0.15 EC consisted of an average rate of 0.021 lb ai/A) that residues of abamectin were found

only in the 0-3 inch soil segment until the 5th application (28 days after the first application). Residues were reported in the 3-6 and 9-12 inch soil segments of the soil samples taken on the day of the 5th and 6th applications (Table 1). However, no residues were reported from the 9-12 inch soil segments of samples taken on the days of the 7th, 8th and 9th application.

- 7.2 As specified in the Conclusions of EFGWB #'s 90710 and 90711 (dated 3 April 90) the half-life of avermectin to dissipate after the 10th (final) weekly application was 31±6 days in a coarse, sandy soil.
- 7.3 It can be concluded that avermectin does not appear to leach and was not detected below the 18 inch soil segment of a coarse sandy, soil at any time during the test period.

ENVIRONMENTAL FATE SUMMARY

The information provided in acceptable studies submitted for the EUP and registration of avermectin indicate that the primary means of dissipation for avermectin applied to the soil and plant surface are by photolysis (soil photolysis half-life <1 day and aqueous photolysis half-life <12 hours). Once avermectin is below the soil surface the primary means of degradation is by microbial metabolism with a reported aerobic soil metabolism half-life of 2 weeks to 2 months and anaerobic soil metabolism was slower or non-existent depending on when anaerobic conditions were established. Avermectin appears to be relatively immobile with reported adsorption (K_{ads}) values of 9.7 in a sandy soil, 30.9 in a silt loam soil, and 134 in a clay loam soil.

Avermectin appears to be stable to hydrolysis at pH 5, 7, and 9 with no significant degradation of parent material after 30 days. Photodegradation is rapid with a half-life of <12 hours in water (the polar degradant fraction was the major fraction present and contained a large number of components; and, although minor in quantity, the major component of the non-polar degradant fraction was identified as the 8,9-geometric isomer of avermectin B_{1a}) and <one day on soil. Under aerobic soil conditions avermectin degraded with a half-life of 2 weeks to 2 months depending on soil type (the major metabolite was an equilibrium mixture of 8- α -hydroxy derivative and the ring opened aldehyde derivative of the parent in a 1:25 ratio). Anaerobic degradation appeared to be slower or non-existent depending on when anaerobic conditions were established. Avermectin had a whole body bioconcentration factor of 69 and after 14 days depuration up to 95% of the avermectin was eliminated, indicating a relatively low potential for accumulation in fish. Leaching and Adsorption/Desorption studies indicated that avermectin binds strongly to the clay loam and silt loam test soils (K_{ads} of 134

and 30.9 respectively), and is less tightly bound to sandy soil (K_{ads} of 9.7) with Freundlich constants for desorption (K_{des}) being similar to those for adsorption. Information from an acceptable field dissipation study indicates that the half-life after the 10th application was 31±6 days in a coarse, sandy soil and that avermectin was not detected below 18 inches.

8.0 RECOMMENDATIONS:

- 8.1 Inform the registrant that this field dissipation study is considered acceptable.
- 8.2 As previously recommended (EFGWB No. 90710 and 90711, dated 3 April 1990) a second field dissipation study should be performed in an area representative of areas where the pesticide is expected to be used at the highest recommended label rate. Rainfall and irrigation data should be submitted with this study.

9.0 BACKGROUND:

Refer to EFGWB # 90710 and 90711 (3 April 90) for materials and methods employed for soil sampling, storage, and analyses methodology. A previous review (EFGWB # 90227, 90225, dated 17 Jan 89) evaluated a field dissipation study and found it to be an interim report. A second review of this field dissipation study (EFGWB # 90710 and 90711, dated 3 April 90) had additional analyses on remaining soil core replicates of the previous review after the tenth application. The analyses in this report (EFGWB # 93-0352) are from soil samples taken on the day of each of the first nine field applications to complete the data requirements for this field dissipation study.

10.0 DISCUSSION OF INDIVIDUAL STUDIES:

The summary (Table 1) of the soil analyses from the present study indicate that avermectin B_{1a} and B_{1b} are not very mobile. No detections were reported below the 0-3 inch soil segments until the 5th application (4 weeks after the first application). Detections of B_{1a} avermectin were reported in the 0-3 inch soil segments after each of the first nine applications. After the 10th application the results were reported in 6 inch increments and avermectin was reported in the 0-6 inch soil segment until 90 days after the final (10th) application. Although avermectin was reported in the 9-12 inch soil segment in soil samples taken immediately after the 5th and 6th weekly applications, no detections were reported from the soil samples in the 9-12 inch soil segments taken on the days of the 7th, 8th, 9th, or 10th application. Not until 7 days after the final application were any detections reported

in the 6-12 inch soil segments (Table A). With the detection limits utilized (detection limit was 0.5 ng/g and limit of quantification was 1.0 ng/g) no detections of avermectin B_{1a} or B_{1b} were in soil segments below 18 inches. By 120 days after the final application no residues of avermectin were reported (Table A). This information indicates that avermectin does not leach rapidly and is only moderately persistent in the soil.

11.0 COMPLETION OF ONE-LINER: N/A

12.0 CBI APPENDIX: N/A

EGWB Review dated 5/10/43 (100-895+100-898)

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Pages 6 through 11 are not included in this copy.

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